Name:_____ Date:_____

PC: Systems of Inequalities Ms. Loughran

Do Now:
Graph the solution set for each inequality on the graph paper provided.

1. $2x - y \leq 8$

2. $-x^2 + y \geq 10$

3. $x^2 + y^2 < 25$

Now that we reviewed how to graph linear and quadratic inequalities, we are going to move on to graphing systems of equalities. Many practical problems in business, science, and engineering involve systems of inequalities. A solution of a system of inequalities in x and y is a point (x, y) that satisfies each inequality in the system.

To sketch the graph of a system of inequalities in two variables, first sketch the graph of each individual inequality (on the same coordinate system) and then find the region that is in common to every graph in the system. It is helpful to find the **vertices** of the solution region. To find the vertices of the region, solve the systems of corresponding equations obtained by taking pairs of equations representing the boundaries of the individual regions. We will often use out calculator to help us find the vertices.

Examples:
For each of the following: graph the solution of the systems of inequalities, label the vertices and name a point that lies in the solution set.

1. $\begin{cases} x + y \geq 4 \\ y \leq 2x - 3 \end{cases}$

2. $\begin{cases} x + y > 3 \\ x - y < 6 \end{cases}$

3. $\begin{cases} y + 3x > 6 \\ y \leq 2x - 4 \end{cases}$

4. $\begin{cases} x + y > 3 \\ x + y < -1 \end{cases}$

5. $\begin{cases} y \geq 2x^2 \\ y \leq 2x + 4 \end{cases}$

6. $\begin{cases} x^2 + y^2 < 9 \\ y \geq 3x + 1 \end{cases}$

7. $\begin{cases} y \leq -x^2 - 2x + 6 \\ y \geq x + 6 \end{cases}$

8. $\begin{cases} (x-3)^2 + y^2 \leq 9 \\ y > 2 \end{cases}$

9. $\begin{cases} y \geq x^2 - 1 \\ -x + y \leq 1 \end{cases}$

10. $\begin{cases} (x+3)^2 + (y+2)^2 \leq 36 \\ y + 4 > 0 \end{cases}$

11. $\begin{cases} y + x^2 < 0 \\ x^2 + y^2 < 9 \end{cases}$

12. $\begin{cases} x^2 + y^2 \leq 4 \\ x - y > 0 \end{cases}$

Practice Exercises

For each of the following: graph the solution of the systems of inequalities, label the vertices and name a point that lies in the solution set.

1. $x+y\le 4$
   $y\ge x$

2. $y<9-x^2$
   $y\ge x+3$

3. $x-y>0$
   $4x+y\le 2x$

4. $x^2+y^2<9$
   $2x+y^2\ge 1$

5. $x^2-y\le 0$
   $2x^2+y\le 12$

6. $x^2+y^2\le 25$
   $4x-3y\le 0$

7. $x^2-y\le 1$
   $-x+y\le 1$

8. $2x+3y>6$
   $x+y-4<0$